



## Mean platelet volume and nuclear red blood cells in patients with septal deviation

MPV and NRBC in patients with septal deviation

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### Abstract

**Aim:** Nasal septal deviation is a frequent cause of nasal obstruction and is defined as the displacement of the nasal septum to one side. Mean platelet volume (MPV) is a complete blood count parameter that provides information about the platelet size. Nuclear red blood cells (NRBCs) are the precursor cells of erythrocytes. We aimed to investigate the MPV and NRBCs, which are complete blood count parameters showing changes in hypoxic conditions in the septal deviation patients and people without nasal obstruction. **Material and Method:** Patients who underwent an operation due to septal deviation and patients who had a septal deviation, but did not have symptoms were examined retrospectively between January 1st, 2017 and October 30th, 2017. Our study population was divided into 3 groups: Patients operated for septal deviation, with Septal Deviation but without symptom, without nasal obstruction, Patients who had blood tests for tinnitus, etc., patients without respiratory complaints during the same period were also included in the study. **Results:** There was no significant difference in the MPV parameters between the group with operation due to septal deviation and the group with nonsymptomatic septal deviation ( $p = 0,999$ ). There was no significant difference between MPV parameters between patients with no nasal obstruction and patients with septal deviation. ( $p = 0,595$  and  $0,520$ ). In all groups, the NRBCs% parameter was no different from zero except 9 patients. **Discussion:** It is thought that the MPV and NRBCs parameters in the operation and symptom evaluation of septal deviation patients will not provide any extra findings.

### Keywords

Septal Deviation; Mean Platelet Volume; Nuclear Red Blood Cells; Nasal Obstruction

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## Introduction

Nasal obstruction is a frequent complaint of admission to Ear Nose and Throat (ENT) Clinics. The main causes of nasal obstruction are adenoid hypertrophy, nasal polyp, tonsillar hypertrophy and nasal septal deviation [1]. Nasal septal deviation is a frequent cause of nasal obstruction and is defined as the displacement of the nasal septum to one side [2,3]. In nasal septal deviation diagnosis, anterior rhinoscopy and endoscopy provide good examination [1-3].

Chronic nasal obstruction causes an increase in upper respiratory tract resistance. Alveolar hypoventilation develops as a result of resistance in the respiratory tract and consequently, chronic hypoxia occurs. Unwanted cardiovascular outcomes occur as a consequence of chronic hypoxia. It is known that unwanted cardiovascular outcomes are associated with changes in platelet count and function, secondary to chronic hypoxia [4]. It has been shown in several studies that chronic hypoxia caused by upper respiratory tract obstructions such as tonsillar hypertrophy, adenoid hypertrophy and nasal polyps may cause many cardiovascular problems such as pulmonary hypertension, cor pulmonale, alveolar hypoventilation [5-7].

Nasal septal deviation should also be considered in the differential diagnosis of hypoxemia due to upper respiratory tract obstruction [7].

Mean platelet volume (MPV) is a complete blood count parameter that provides information about the platelet size. MPV is also an indication of the platelet function. In addition, it provides information on platelet production rate, activation and stimulation [8-10]. Platelet sizes are thought to be related to platelet reactivity [10]. Large platelets are more metabolically and enzymatically active. In larger thrombocytes, the elevation of thromboxane A<sub>2</sub> and procoagulant surface protein levels causes an increase in prothrombotic potential [10-13].

Previous studies have suggested a correlation between hypoxia and platelet volumes [11-13]. However, the mechanism of platelet activation developing secondary to hypoxia is not completely understood. As the most probable mechanism, it has been suggested that the increase in sympathetic activity due to the increase in epinephrine and norepinephrine concentrations as a consequence of chronic hypoxia leads to thrombocyte activation by causing platelet volume and shape change [10-13]. In addition, inflammation and chronic hypoxia caused by nasal septal deviation may cause endothelial dysfunction and platelet activation. It has been shown that MPV levels are elevated in inflammatory diseases and MPV has a role in both inflammation and thrombosis [14].

Nuclear red blood cell (NRBCs) is a complete blood count parameter that is automatically counted along with the development of automated hematology devices' performance and features.

NRBCs are the precursor cells of erythrocytes and these cells are immature, nucleated erythrocytes that go out to the peripheral circulation because of the normoblasts that could not lose their nucleus before leaving the bone marrow. In the pathogenesis of peripheral vascular NRBCs, a causal relationship has been established with ineffective erythropoiesis, stress erythropoiesis and primary abnormalities of erythropoiesis. Erythropoiesis induction due to hypoxia is the most important factor

causing the increase in NRBCs [8-13].

We aimed to investigate the MPV and NRBCs, which is a complete blood count parameter showing changes in hypoxic conditions in the septal deviation patients and people with no nasal obstruction.

## Material and Method

In our study, patients who underwent an operation due to septal deviation and patients who had a septal deviation, but did not have symptom, were examined retrospectively between January 1st, 2017 and October 30th, 2017. Patients who had blood tests for tinnitus, etc., without complaints of breathing during the same period were also included in the study. The study was approved by the local Ethics Committee (2017/20).

Patients were diagnosed with nasal septal deviation with a detailed history, anterior rhinoscopy, and endoscopic examination findings. Patients with previous history of septoplasty and sino-nasal surgery, patients with nasal pathology other than isolated septum pathology, patients with chronic sinusitis, concha hypertrophy, sleep apnea syndrome, adenoid hypertrophy, asthma, craniofacial anomalies, hypertension, diabetes, coagulopathy and systemic disease, patients under the age of 18 and over the age of 60 were excluded from the study. Preoperative complete blood count values of the patients who underwent surgery for septal deviation were examined.

Complete blood counts were performed in the Sysmex XN-3000 complete blood count device. Our study population was divided into 3 groups: Patients operated for septal deviation (Group 1), Patients with Septal Deviation but without symptom (Group 2), Patients had no septal deviation and nasal obstruction (Group 3-control group).

SPSS v.20 program was used for statistical evaluation. Inter-group significance was assessed by One-Way ANOVA test with Post-Hoc Tukey HSD test. Values are given as mean and standard deviation.

In this study, we aimed to investigate the MPV and NRBCs, which are complete blood count parameters showing changes in hypoxic conditions in the septal deviation patients and people who with no nasal obstruction.

## Results

In our study, 53 patients who underwent an operation due to septal deviation and 90 patients who had a septal deviation without symptom and 99 patients who had no nasal obstruction were examined retrospectively between January 1st, 2017 and October 30th, 2017.

The mean age of the groups in the population studied was similar ( $p = 0.237$ ). Table 1 shows the average age and gender distribution.

There was no significant difference in the MPV parameters between the group with operation due to septal deviation and the group with nonsymptomatic septal deviation ( $p = 0.999$ ). There was no significant difference between MPV parameters between patients with no nasal obstruction and patients with septal deviation. ( $p = 0.595$  and  $0.520$ ). In all groups, the NRBCs% parameter was equal to zero except 9 patients. Four of these nine patients were in Group 3, four in Group 2, and one in Group 1. The values of patients with non-zero NRBCs%

values were low between 0,1-0,2. The mean and standard deviation values of MPV and NRBCs% parameters are shown in Table 2.

Table 1. The average age and gender distribution.

	Group 1(operated for septal deviation)	Group 2(with septal deviation without symptom)	Group 3(control group)
Female(n)	8	34	50
Male(n)	45	56	49
Total	53	90	99
Age	33,06±10,32	34,26±10,12	35,72±8,36

Table 2. The mean and standard deviation values of MPV and NRBCs% parameters

	Group 1	Group 2	Group 3
MPV	10,38±0,95	10,39±0,91	10,54±0,96
NRBCs%	0,002±0,014	0,007±0,033	0,005±0,027

## Discussion

Nasal obstruction is a frequent complaint in patients admitted to the ear, nose and throat clinic. Nasal obstruction causes increased resistance in the upper respiratory tract and cardiovascular complications develop due to hypoxia because of increased resistance in the upper respiratory tract.

There are many studies on blood count parameters that show changes secondary to hypoxia in nasal obstruction diseases such as nasal septal deviation. Various studies have shown an increase in platelet activation in patients with chronic obstructive respiratory tract disease and the increase in platelet activation has been associated with the airway obstruction [14-19]. Studies have shown an increase in MPV levels in clinical conditions which creates chronic hypoxia such as obstructive sleep apnea[20]. In addition, continuous positive treatment (CPAP) has been shown to reduce platelet activation [20]. Kucur et al. reported that MPV levels in children with adenoid hypertrophy were higher than those in healthy controls and that MPV levels after adenoidectomy decreased significantly in these patients [16]. Steiropoulos et al. also reported that patients with the chronic obstructive pulmonary disease had relatively high MPV values [21]. Sagit et al. reported a correlation between MPV elevation and increased cardiopulmonary risk in patients with nasal septal deviation and that MPV values were regressed with septoplasty [22]. Fidan et al. have reported that septoplasty can prevent permanent cardiopulmonary disorders in patients with nasal septal deviation [23]. In another study conducted in a septal deviation patient group, MPV values were reported to be higher than in the control group [7].

When the literature was searched, there was no study evaluating the status of the MPV parameter in patients with septal deviation who were operated or non-symptomatic. In our study, we examined the MPV parameter in the operated and non-symptomatic of nasal septal deviation patients. There was no significant difference in the MPV parameters between the group with operated and the group without symptomatic. There was also no significant difference in MPV parameters between the group with no breathing complaints, which was another comparative group, and those with septal deviation patients who were oper-

ated or non-symptomatic. This finding suggests that there may be other factors besides hypoxia affecting MPV in the operated or non-symptomatic septal deviation patients and in the group without nasal obstruction.

The NRBCs parameter, indicative of increased erythropoiesis secondary to hypoxia, has not been previously investigated in this patient population. NRBCs elevation was detected in newborns of smokers and mothers exposed to extreme air pollution [22-25]. Soothill et al. showed that fetal hypoxemia and fetal acidosis severity correlate with NRBCs elevation in umbilical cord blood samples obtained by cordocentesis from fetuses with growth-retardation [25].

In our study, there was no NRBCsin the peripheral blood in the complete blood count results of the patient groups. Erythropoiesis stimulating in response to chronic hypoxia is an expected situation. However, it has been understood that hypoxia in our septal deviation patients group is not high enough to induce erythropoiesis.

## Conclusion

In conclusion, it is thought that the MPV and NRBCs parameters in the operation and symptom evaluation of septal deviation patients will not provide any extra findings. Therefore, prospectively designed studies in this field are required.

## Scientific Responsibility Statement

*The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.*

## Animal and human rights statement

*All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.*

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## Conflict of interest

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